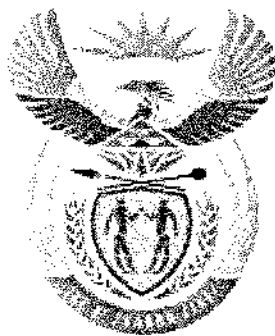


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**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

NOVEMBER EXAMINATION

FITTING AND MACHINING THEORY N1

11 NOVEMBER 2014

This marking guideline consists of 10 pages.

SECTION A**QUESTION 1: OCCUPATIONAL SAFETY**

- 1.1 1.1.1
- Advertise and propagate correct techniques by means of demonstration boards.
 - Prepare the worker by teaching him to know his work thoroughly.
 - Stress the necessity of proper lighting.
 - Maintenance of electric cables and electric hand tools
 - Protection of machinery blades
 - Workshop conditions and the prevention of accidents by keeping floors and walkways clear (Any 3 × 1) (3)
- 1.1.2
- To carry or lift objects with sharp edges
 - To prevent cuts from sharp edges
 - To prevent burns from hot items
 - To prevent chemical burns when handling hazardous chemicals
 - To improve grip when handling objects (Any 2 × 1) (2)
- [5]

OR

- 1.2 1.2.1 At each change room (1)
- 1.2.2 Complaints on safety or health conditions (2)
- 1.2.3 Competent person appointed by the manager on a daily basis (2)
- [5]

QUESTION 2: MEASURING INSTRUMENTS

2.1 2.1.1 99,89 mm

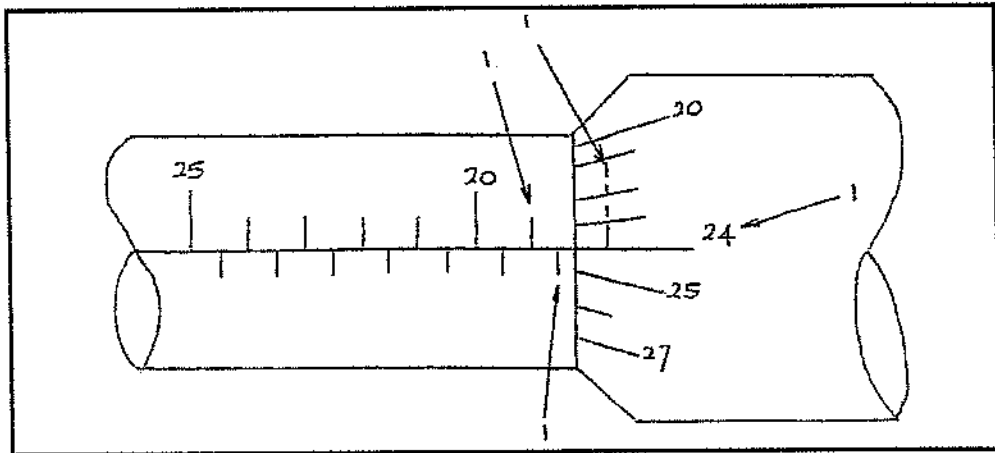
2.1.2 0,01 mm

2.1.3 13 mm

2.1.4 A long handle is supplied for taking measurements at the back of deep-diameter holes.

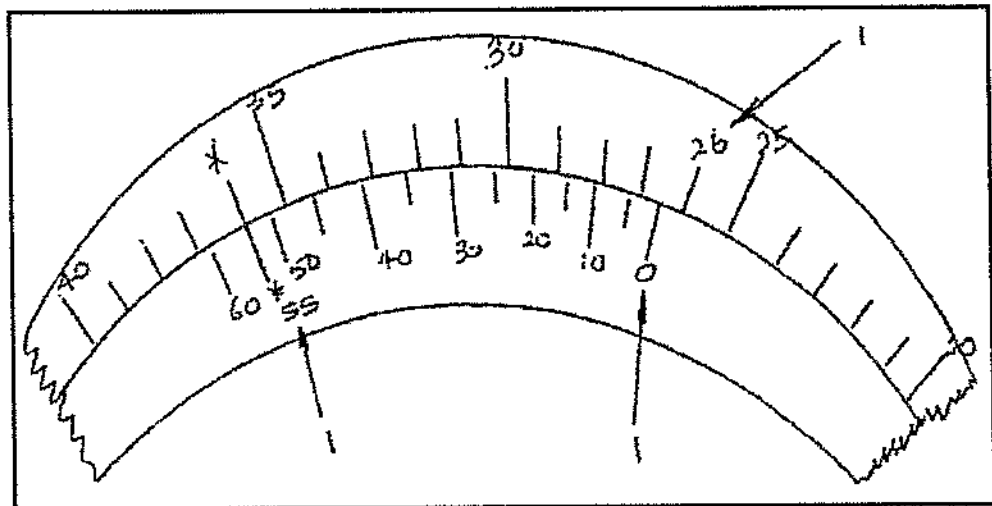
(4)

2.2 2.2.1



(4)

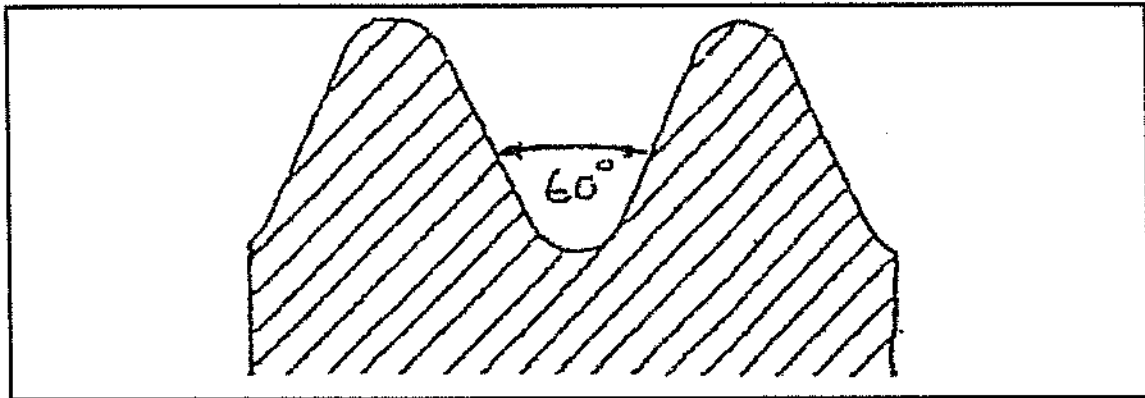
2.2.2



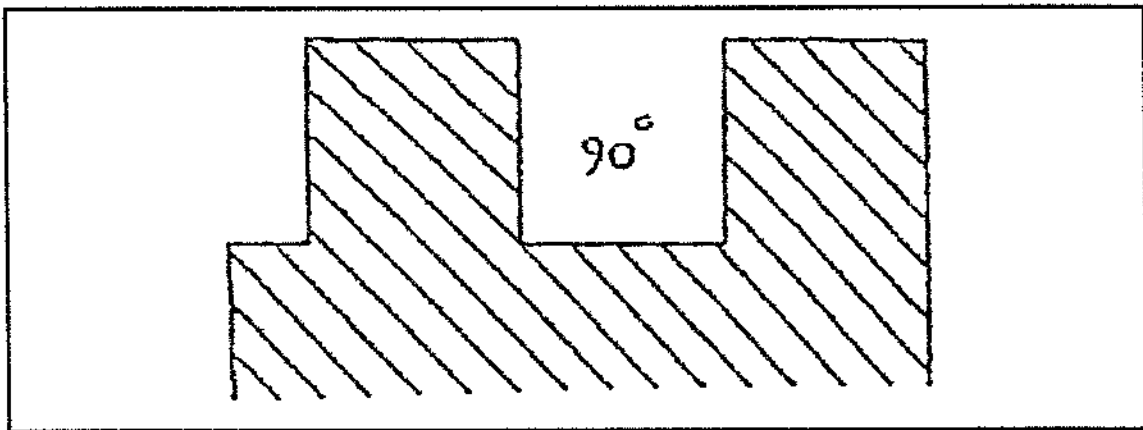
(3)
[11]

QUESTION 3: SCREW THREADS

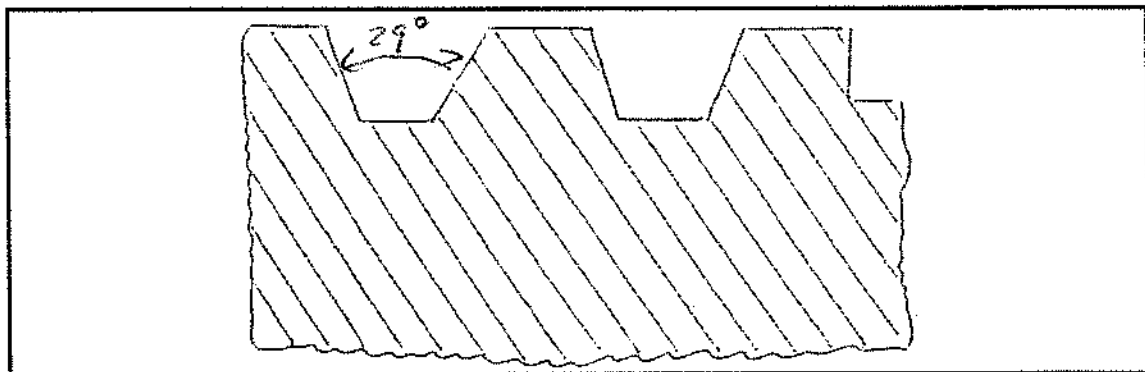
3.1



3.2



3.3



(3 × 2)

[6]

QUESTION 4: HAND TOOLS

- 4.1 Soft-face hammers are used to hammer delicate workpieces with finished surfaces.
- 4.2 We use a second-cut grade file to rough out hard metals and to file the work-piece to almost size.
- 4.3 To cut or shave material of sheet metal or to thin metal down by removing material from the sides of the workpiece.
- 4.4 To mark off holes which must be drilled.
- 4.5 It is used to grip small cylindrical or flat sheet metal workpieces or use them to bend wire and thin sheet metal.
- 4.6 Chain tongs are used for gripping and turning pipes.

(6 × 1)

[6]**QUESTION 5: METALS AND PLASTICS**

- 5.1 Grey cast iron – machine tools, machine beds, and frames, engine blocks, marking-off tables, surface plates.

White cast iron – Crushing equipment
 – Grinding mills
 – Cams

(4)

- 5.2 Hardening – The whole workpiece is hardened and produces a hard wear-resistant part.

Case hardening – It produces a hard outer skin or surface with a soft inner core to handle shock loads.

(2)

- 5.3 5.3.1 Brass – copper and zinc
 Properties: Low melting point
 Strong and ductile
 Corrosion resistant
 Uses : Wire rods
 Tubes
 Water fittings
 Bolts and nuts

- 5.3.2 Bronze – copper and tin
 Properties – Resistant wear
 – Corrosion resistant
 Uses : – Gears
 – Valves
 – Machine bearings
 – Pump impellers
 One mark for composition
 One mark for one property
 One mark for one use

(2 × 3) (6)
 [12]

QUESTION 6: MARKING-OFF

- A – Divider
 B – Scriber
 C – Jenny calliper, odd-leg caliper
 D – Angle plate
 E – Surface gauge

(5 × 1) [5]

QUESTION 7: KEYS AND KEYWAYS

7.1 Shaping machine – with rigid boring bar or solid grooving tool

Milling machine – with slotting attachment or using side or face cutter (1)

- 7.2
- The feed shaft for a lathe
 - The lifting spindle of a jack
 - A tailstock spindle, where the key prevents the spindle from turning
- (Any 2 × 1) (2)

7.3 D = 45 mm
 RTC = H&W

$$H = \frac{D}{6} = \frac{45}{6} = 7,5 \text{ mm}$$

$$W = \frac{D}{4} = \frac{45}{4} = 11,25 \text{ mm}$$

$$L = 1,5 D = 1,5 \times 45 = 67,5 \text{ mm} \quad (3)$$

[6]

QUESTION 8: FASTENERS

- 8.1 Locking wire – When there are several screws in close proximity on a small pitch circle
- 8.2 Allen screws – Used to retain a knob, collar or pulley on a shaft.
- 8.3 Drive screws – are used when it is impractical to use rivets.
- 8.4 Cir-clips – Are used to prevent axial or end movement of parts

(4 × 1) [4]

QUESTION 9: HAND TAPS, STOCKS, DIES AND REAMERS

- 9.1
- The drilled hole is too small or large: Drill the hole to the correct size.
 - The tap is not square in the hole. Keep the tap in an upright position and test it for squareness.
 - Tap wrench is not used correctly. Use correct pressure on the tap wrench so that when the thread starts the tap draws or pulls itself into the hole.
 - Cutting fluid is not used: Use a suitable cutting fluid for the type of material being tapped.
 - The tap is turned after the bottom of the hole is reached.
 - Only turn the tap until the correct depth is reached.
 - Excessive material is not cleared away often enough.
 - Turn the tap in an anticlockwise direction as often as possible and clear excess material away.

(Any 4 × 1) (4)

- 9.1 The letter L is usually stamped on the shank of the left tap.

(1)
[5]**TOTAL SECTION A: 60**

SECTION B

ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS FROM THIS SECTION

QUESTION 10: DRILLING MACHINES

- 10.1
- The drill is cooled
 - Higher cutting speeds may be obtained
 - Cuttings are washed away
 - A smooth finish is provided
 - Corrosion is prevented
 - The workpiece is cooled
- (Any 3 × 1) (3)

10.2

$$N = \frac{1000S}{\pi D}$$

$$D = \frac{1000S}{\pi \times N}$$

$$= \frac{1000 \times 30}{\pi \times 800}$$

$$= 11,94 \text{ mm}$$

$$N = 12 \text{ mm} \quad (3)$$

- 10.3
- | | |
|--------|-------|
| 10.3.1 | False |
| 10.3.2 | True |
| 10.3.3 | False |
| 10.3.4 | True |
- (4 × 1) (4)
[10]

QUESTION 11: GRINDING MACHINES AND MACHINE CUTTING TOOLS

- 11.1.1 Positive rake is when the wedge angle is less than 90 degrees.
- Negative rake is when the cutting edge is strong and the wedge is strong and the wedge angle is 90 degrees. (2)
- 11.2 In order for affluent material coming off in long continuous chips and making handling dangerous, a chip breaker provides chip control. The action of the chip breaker forces the chip into a tighter spiral than it will normally form, this work hardens the chip, making it sufficiently brittle to break up into short lengths which are easily disposed of. (2)
- 11.3
- A – Side-roughing tool
 - B – Knife tool
 - C – Screw-cutting tool
 - D – Grooving tool
 - E – Parting tool
- (6 × 1) (6)
[10]

QUESTION 12: GENERAL

- 12.1 True
 12.2 False
 12.3 False
 12.4 True
 12.5 False
 12.6 True
 12.7 False
 12.8 True
 12.9 True
 12.10 True

(10 × 1) [10]

QUESTION 13: CENTRE LATHE

- 13.1
- General turning
 - Taper turning
 - Internal turning operation
 - Drilling operation
 - Facing
 - Screw-thread cutting
- (Any 3 × 1) (3)
- 13.2
- The four-jaw independent chuck has considerable gripping power allowing the operator to take heavy cuts.
 - The jaws can hold a wide range of irregular shapes.
 - You can set workpieces to run concentrically or eccentrically.
 - The chuck stays accurate, even if it is worn.
 - You can readily do facing or boring.
- (Any 3 × 1) (3)
- 13.3
- The rotating centre cannot damage the centre hole.
 - Less friction between centre and centre hole.
- (2)
- 13.4
- The setup time to manufacture one part is a loss.
 - It is more expensive.
 - It costs a lot to repair.
- (Any 2 × 1) (2)
[10]

QUESTION 14: MILLING MACHINE

14.1	A – Overarm B – Arbor support C – Arbor D – Knee E – Spindle		(5 × 1)	(5)
14.2	14.2.1 True 14.2.2 False 14.2.3 True 14.2.4 True 14.2.5 False		(5 × 1)	(5) [10]

TOTAL SECTION B: 40
GRAND TOTAL: 100